



Analytical Laboratory

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13339 Hagers Ferry Road
Huntersville, NC 28078-7929
McGuire Nuclear Complex - MG03A2
Phone: 980-875-5245 Fax: 980-875-4349

Order Summary Report

Order Number: J12080079

Project Name: WWTS - Biweekly (1)

Customer Name(s): Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson

Customer Address: 3195 Pine Hall Rd
Mailcode: Belews Steam Station
Belews Creek, NC 28012

Lab Contact: Jason C Perkins Phone: 980-875-5348

Report Authorized By: _____ **Date:** 8/30/2012
(Signature)

Program Comments:

Please contact the Program Manager (Jason C Perkins) with any questions regarding this report.

Data Flags & Calculations:

Any analytical tests or individual analytes within a test flagged with a Qualifier indicate a deviation from the method quality system or quality control requirement. The qualifier description is found at the end of the Certificate of Analysis (sample results) under the qualifiers heading. All results are reported on a dry weight basis unless otherwise noted. Subcontracted data included on the Duke Certificate of Analysis is to be used as information only. Certified vendor results can be found in the subcontracted lab final report. Duke Energy Analytical Laboratory subcontracts analyses to other vendor laboratories that have been qualified by Duke Energy to perform these analyses except where noted.

Data Package:

This data package includes analytical results that are applicable only to the samples described in this narrative. An estimation of the uncertainty of measurement for the results in the report is available upon request. This report shall not be reproduced, except in full, without the written consent of the Analytical Laboratory. Please contact the Analytical laboratory with any questions. The order of individual sections within this report is as follows:

Job Summary Report, Sample Identification, Technical Validation of Data Package, Analytical Laboratory Certificate of Analysis, Analytical Laboratory QC Reports, Sub-contracted Laboratory Results, Customer Specific Data Sheets, Reports & Documentation, Customer Database Entries, Test Case Narratives, Chain of Custody (COC)

Certification:

The Analytical Laboratory holds the following State Certifications : North Carolina (DENR) Certificate #248, South Carolina (DHEC) Laboratory ID # 99005. Contact the Analytical Laboratory for definitive information about the certification status of specific methods.

Sample ID's & Descriptions:

Sample ID	Plant/Station	Collection Date and Time	Collected By	Sample Description
2012016850	BELEWS	08-Aug-12 8:30 AM	TRAVIS THORNTON	FGD Purge Eff
2012016851	BELEWS	08-Aug-12 8:30 AM	TRAVIS THORNTON	EQ TANK EFF.
2012016852	BELEWS	08-Aug-12 8:30 AM	TRAVIS THORNTON	BIOREACTOR 1 INF.
2012016853	BELEWS	08-Aug-12 8:30 AM	TRAVIS THORNTON	BIOREACTOR 2 INF.
2012016854	BELEWS	08-Aug-12 8:30 AM	TRAVIS THORNTON	BIOREACTOR 2 EFF.
2012016855	BELEWS	08-Aug-12 8:30 AM	TRAVIS THORNTON	FILTER BLANK
2012016856	BELEWS	08-Aug-12 8:30 AM	TRAVIS THORNTON	Trip Blank
2012016857	BELEWS	08-Aug-12 8:00 AM	TRAVIS THORNTON	BIOREACTOR 1 INF (HG)
2012016858	BELEWS	08-Aug-12 8:00 AM	TRAVIS THORNTON	HG BLANK BIOREACTOR 1 INF.
2012016859	BELEWS	08-Aug-12 8:00 AM	TRAVIS THORNTON	BIOREACTOR 2 INF (HG)
2012016860	BELEWS	08-Aug-12 8:00 AM	TRAVIS THORNTON	Hg Blk BioReactor 2 Inf
2012016861	BELEWS	08-Aug-12 8:00 AM	TRAVIS THORNTON	BIOREACTOR 2 EFF (HG)
2012016862	BELEWS	08-Aug-12 8:00 AM	TRAVIS THORNTON	Hg Blk BioReactor 2 Eff
13 Total Samples				

Technical Validation Review

Checklist:

COC and .pdf report are in agreement with sample totals and analyses (compliance programs and procedures).

☒ Yes☐ No

All Results are less than the laboratory reporting limits.

☐ Yes☒ No

All laboratory QA/QC requirements are acceptable.

☒ Yes☐ No

Report Sections Included:

☒ Job Summary Report☒ Sample Identification☒ Technical Validation of Data Package☒ Analytical Laboratory Certificate of Analysis☐ Analytical Laboratory QC Report☒ Sub-contracted Laboratory Results☐ Customer Specific Data Sheets, Reports, & Documentation☐ Customer Database Entries☒ Chain of Custody☒ Electronic Data Deliverable (EDD) Sent Separately

Reviewed By: DataBase Administrator

Date: 8/30/2012

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J12080079**

Site: FGD Purge Eff

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016850

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>INORGANIC IONS BY IC</u>								
Bromide	120	mg/L		5	50	EPA 300.0	8/13/2012 6:37:00 PM	JAHERMAN
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	295	ug/L		5	100	EPA 245.1	8/16/2012 1:22:53 PM	AGIBBS
<u>DISSOLVED METALS BY ICP</u>								
Manganese (Mn)	9.20	mg/L		0.05	10	EPA 200.7	8/14/2012 10:50:00 AM	MHH7131
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	218	mg/L		0.5	10	EPA 200.7	8/22/2012 12:31:00 PM	DJSULL1
Manganese (Mn)	9.75	mg/L		0.05	10	EPA 200.7	8/22/2012 12:31:00 PM	DJSULL1
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	179	ug/L		10	10	EPA 200.8	8/14/2012 1:55:00 PM	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	230	ug/L		10	10	EPA 200.8	8/16/2012 11:16:00 AM	KRICHAR
Chromium (Cr)	257	ug/L		10	10	EPA 200.8	8/16/2012 11:16:00 AM	KRICHAR
Copper (Cu)	145	ug/L		10	10	EPA 200.8	8/16/2012 11:16:00 AM	KRICHAR
Nickel (Ni)	222	ug/L		10	10	EPA 200.8	8/16/2012 11:16:00 AM	KRICHAR
Selenium (Se)	5610	ug/L		10	10	EPA 200.8	8/16/2012 11:16:00 AM	KRICHAR
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:16:00 AM	KRICHAR
Zinc (Zn)	273	ug/L		10	10	EPA 200.8	8/16/2012 11:16:00 AM	KRICHAR
<u>SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)</u>								
Vendor Parameter	Complete					Vendor Method	V_AS&C	
<u>TOTAL DISSOLVED SOLIDS</u>								
TDS	21000	mg/L		200	1	SM2540C	8/15/2012 4:29:00 PM	TJA7067

Site: EQ TANK EFF.

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016851

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	206	ug/L		2.5	50	EPA 245.1	8/16/2012 1:25:13 PM	AGIBBS
<u>DISSOLVED METALS BY ICP</u>								
Manganese (Mn)	8.89	mg/L		0.05	10	EPA 200.7	8/14/2012 10:54:00 AM	MHH7131
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	220	mg/L		0.5	10	EPA 200.7	8/22/2012 12:35:00 PM	DJSULL1
Manganese (Mn)	9.71	mg/L		0.05	10	EPA 200.7	8/22/2012 12:35:00 PM	DJSULL1

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J12080079**

Site: EQ TANK EFF.

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016851

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	127	ug/L		10	10	EPA 200.8	8/14/2012 1:58:00 PM	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	204	ug/L		10	10	EPA 200.8	8/16/2012 11:20:00 AM	KRICHR
Chromium (Cr)	223	ug/L		10	10	EPA 200.8	8/16/2012 11:20:00 AM	KRICHR
Copper (Cu)	129	ug/L		10	10	EPA 200.8	8/16/2012 11:20:00 AM	KRICHR
Nickel (Ni)	202	ug/L		10	10	EPA 200.8	8/16/2012 11:20:00 AM	KRICHR
Selenium (Se)	5010	ug/L		10	10	EPA 200.8	8/16/2012 11:20:00 AM	KRICHR
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:20:00 AM	KRICHR
Zinc (Zn)	235	ug/L		10	10	EPA 200.8	8/16/2012 11:20:00 AM	KRICHR

Site: BIOREACTOR 1 INF.

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016852

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>DISSOLVED METALS BY ICP</u>								
Manganese (Mn)	8.73	mg/L		0.05	10	EPA 200.7	8/14/2012 10:58:00 AM	MHH7131
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	220	mg/L		0.5	10	EPA 200.7	8/22/2012 12:39:00 PM	DJSULL1
Manganese (Mn)	8.79	mg/L		0.05	10	EPA 200.7	8/22/2012 12:39:00 PM	DJSULL1
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	114	ug/L		10	10	EPA 200.8	8/14/2012 2:01:00 PM	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:23:00 AM	KRICHR
Chromium (Cr)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:23:00 AM	KRICHR
Copper (Cu)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:23:00 AM	KRICHR
Nickel (Ni)	115	ug/L		10	10	EPA 200.8	8/16/2012 11:23:00 AM	KRICHR
Selenium (Se)	104	ug/L		10	10	EPA 200.8	8/16/2012 11:23:00 AM	KRICHR
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:23:00 AM	KRICHR
Zinc (Zn)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:23:00 AM	KRICHR

SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)

Vendor Parameter	Complete	Vendor Method	V_AS&C
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Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J12080079**

Site: BIOREACTOR 2 INF.

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016853

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	218	mg/L		0.5	10	EPA 200.7	8/22/2012 12:43:00 F	DJSULL1
Manganese (Mn)	7.57	mg/L		0.05	10	EPA 200.7	8/22/2012 12:43:00 F	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:26:00 A	KRICHAR
Chromium (Cr)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:26:00 A	KRICHAR
Copper (Cu)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:26:00 A	KRICHAR
Nickel (Ni)	15.0	ug/L		10	10	EPA 200.8	8/16/2012 11:26:00 A	KRICHAR
Selenium (Se)	22.4	ug/L		10	10	EPA 200.8	8/16/2012 11:26:00 A	KRICHAR
Silver (Ag)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:26:00 A	KRICHAR
Zinc (Zn)	< 10	ug/L		10	10	EPA 200.8	8/16/2012 11:26:00 A	KRICHAR

Site: BIOREACTOR 2 EFF.

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016854

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>INORGANIC IONS BY IC</u>								
Bromide	120	mg/L		5	50	EPA 300.0	8/13/2012 6:19:00 P	JAHERMA
<u>MERCURY (COLD VAPOR) IN WATER</u>								
Mercury (Hg)	< 1	ug/L		1	20	EPA 245.1	8/16/2012 1:27:33 P	AGIBBS
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	213	mg/L		0.5	10	EPA 200.7	8/22/2012 12:47:00 F	DJSULL1
Manganese (Mn)	5.56	mg/L		0.05	10	EPA 200.7	8/22/2012 12:47:00 F	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 5	ug/L		5	5	EPA 200.8	8/16/2012 11:29:00 A	KRICHAR
Chromium (Cr)	< 5	ug/L		5	5	EPA 200.8	8/16/2012 11:29:00 A	KRICHAR
Copper (Cu)	< 5	ug/L		5	5	EPA 200.8	8/16/2012 11:29:00 A	KRICHAR
Nickel (Ni)	< 5	ug/L		5	5	EPA 200.8	8/16/2012 11:29:00 A	KRICHAR
Selenium (Se)	8.35	ug/L		5	5	EPA 200.8	8/16/2012 11:29:00 A	KRICHAR
Silver (Ag)	< 5	ug/L		5	5	EPA 200.8	8/16/2012 11:29:00 A	KRICHAR
Zinc (Zn)	< 5	ug/L		5	5	EPA 200.8	8/16/2012 11:29:00 A	KRICHAR

SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)

Vendor Parameter

Complete

Vendor Method

V_AS&C

Certificate of Laboratory Analysis

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*This report shall not be reproduced, except in full.***Order # J12080079**

Site: FILTER BLANK

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016855

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>DISSOLVED METALS BY ICP</u>								
Manganese (Mn)	< 0.005	mg/L		0.005	1	EPA 200.7	8/14/2012 11:02:00 A	MHH7131
<u>DISSOLVED METALS BY ICP-MS</u>								
Selenium (Se)	1.05	ug/L	B	1	1	EPA 200.8	8/14/2012 1:27:00 PM	DJSULL1

Site: Trip Blank

Collection Date: 08-Aug-12 8:30 AM

Sample #: 2012016856

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>TOTAL RECOVERABLE METALS BY ICP</u>								
Boron (B)	< 0.05	mg/L		0.05	1	EPA 200.7	8/22/2012 12:23:00 F	DJSULL1
Manganese (Mn)	< 0.005	mg/L		0.005	1	EPA 200.7	8/22/2012 12:23:00 F	DJSULL1
<u>TOTAL RECOVERABLE METALS BY ICP-MS</u>								
Arsenic (As)	< 1	ug/L		1	1	EPA 200.8	8/16/2012 10:28:00 A	KRICHA
Chromium (Cr)	< 1	ug/L		1	1	EPA 200.8	8/16/2012 10:28:00 A	KRICHA
Copper (Cu)	< 1	ug/L		1	1	EPA 200.8	8/16/2012 10:28:00 A	KRICHA
Nickel (Ni)	< 1	ug/L		1	1	EPA 200.8	8/16/2012 10:28:00 A	KRICHA
Selenium (Se)	< 1	ug/L		1	1	EPA 200.8	8/16/2012 10:28:00 A	KRICHA
Silver (Ag)	< 1	ug/L		1	1	EPA 200.8	8/16/2012 10:28:00 A	KRICHA
Zinc (Zn)	< 1	ug/L		1	1	EPA 200.8	8/16/2012 10:28:00 A	KRICHA

SELENIUM SPECIATION - (Analysis Performed by Applied Speciation and Consulting, LLC)

Vendor Parameter	Complete	Vendor Method	V_AS&C
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Site: BIOREACTOR 1 INF (HG)

Collection Date: 08-Aug-12 8:00 AM

Sample #: 2012016857

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631 - (Analysis Performed by Brooks Rand Labs LLC)</u>								
Vendor Parameter	Complete					Vendor Method		V_BRAND

Site: HG BLANK BIOREACTOR 1 INF.

Collection Date: 08-Aug-12 8:00 AM

Sample #: 2012016858

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
<u>MERCURY 1631 - (Analysis Performed by Brooks Rand Labs LLC)</u>								
Vendor Parameter	Complete					Vendor Method		V_BRAND

Certificate of Laboratory Analysis

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This report shall not be reproduced, except in full.

Order # J12080079

Site: HG BLANK BIOREACTOR 1 INF.

Collection Date: 08-Aug-12 8:00 AM

Sample #: 2012016858

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
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Site: BIOREACTOR 2 INF (HG)

Collection Date: 08-Aug-12 8:00 AM

Sample #: 2012016859

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
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MERCURY 1631 - (Analysis Performed by Brooks Rand Labs LLC)

Vendor Parameter

Complete

Vendor Method

V_BRAND

Site: Hg Blk BioReactor 2 Inf

Collection Date: 08-Aug-12 8:00 AM

Sample #: 2012016860

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
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MERCURY 1631 - (Analysis Performed by Brooks Rand Labs LLC)

Vendor Parameter

Complete

Vendor Method

V_BRAND

Site: BIOREACTOR 2 EFF (HG)

Collection Date: 08-Aug-12 8:00 AM

Sample #: 2012016861

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
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MERCURY 1631 - (Analysis Performed by Brooks Rand Labs LLC)

Vendor Parameter

Complete

Vendor Method

V_BRAND

Site: Hg Blk BioReactor 2 Eff

Collection Date: 08-Aug-12 8:00 AM

Sample #: 2012016862

Matrix: OTHER

Analyte	Result	Units	Qualifiers	RDL	DF	Method	Analysis Date/Time	Analyst
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MERCURY 1631 - (Analysis Performed by Brooks Rand Labs LLC)

Vendor Parameter

Complete

Vendor Method

V_BRAND

Qualifiers:

- B** Target analyte detected in method blank at or above the reporting limit. Target analyte concentration in sample is less than 10X the concentration in the method blank. Analyte concentration in sample could be due to contamination.



**APPLIED SPECIATION
AND CONSULTING, LLC**

18804 Northcreek Parkway Bothell, WA, 98011
Tel: (425) 483-3300 Fax: (425) 483-9818
www.appliedspeciation.com

August 20, 2012

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078
(704) 875-5245

Project: Belews - FGD WWTS Bi-Monthly Sampling) (LIMS #J12080079)

Dear Mr. Perkins,

Attached is the report associated with four (4) aqueous samples submitted for selenium speciation analysis on August 9, 2012. The samples were received in a sealed cooler at -0.3°C on August 10, 2012. Selenium speciation analysis was performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Any issues associated with the analysis are addressed in the following report.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Russell Gerads", with a large, sweeping flourish at the end.

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Applied Speciation and Consulting, LLC

Report prepared for:

Jay Perkins
Duke Energy Analytical Laboratory
Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd.
Huntersville, NC 28078

Project: Belews - FGD WWTS Bi-Monthly Sampling) (LIMS #J12080079)

August 20, 2012

1. Sample Reception

Four (4) aqueous samples in 125mL HDPE bottles (provided by Applied Speciation and Consulting) were submitted for selenium speciation analysis on August 9, 2012. The samples were received on August 10, 2012 in a sealed container at -0.3°C.

The samples were received in a laminar flow clean hood, void of trace metals contamination and ultra-violet radiation, and were designated discrete sample identifiers. An aliquot of each sample was filtered (0.45µm) and each filtrate was stored in a secure, monitored cryofreezer (maintained at a temperature of -80°C) until selenium speciation analysis could be performed via ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS).

2. Sample Preparation

All sample preparation is performed in laminar flow clean hoods known to be free from trace metals contamination. All applied water for dilutions and sample preservatives are monitored for contamination to account for any biases associated with the sample results.

Selenium Speciation Analysis by IC-ICP-CRC-MS Prior to analysis, an aliquot of each sample was filtered with a syringe filter (0.45µm) and injected directly into a sealed autosampler vial. No further sample preparation was performed as any chemical alteration of a sample may shift the equilibrium of the system, resulting in changes in speciation ratios.

3. Sample Analysis

All sample analysis is preceded by a minimum of a five-point calibration curve spanning the entire concentration range of interest. Calibration curves are performed at the beginning of each analytical day. All calibration curves, associated with each species of interest, are

standardized by linear regression resulting in a response factor. All sample results are **instrument blank corrected** to account for any operational biases associated with the analytical platform.

Prior to sample analysis, all calibration curves are verified using second source standards which are identified as initial calibration verification standards (ICV).

Ongoing instrument performance is identified by the analysis of continuing calibration verification standards (CCV) and continuing calibration blanks (CCB) at a minimal interval of every ten analytical runs.

Selenium Speciation Analysis by IC-ICP-CRC-MS Each sample for selenium speciation analysis was analyzed by ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS) on August 17, 2012. An aliquot of each sample is injected onto an anion exchange column and mobilized by a basic ($\text{pH} > 7$) gradient. The eluting selenium species are then introduced into a radio frequency (RF) plasma where energy-transfer processes cause desolvation, atomization, and ionization. The ions are extracted from the plasma through a differentially-pumped vacuum interface and travel through a pressurized chamber (CRC) containing a reaction gas which preferentially reacts with interfering ions of the same target mass to charge ratios (m/z). A solid-state detector detects ions transmitted through the mass analyzer and the resulting current is processed by a data handling system.

Retention times for each eluting species are compared to known standards for species identification.

4. Analytical Issues

The overall analyses went well and no significant analytical issues were encountered. All quality control parameters associated with the samples were within acceptance limits.

The estimated method detection limits (eMDLs) for selenite, selenate, and selenocyanate are generated from replicate analyses of the lowest standard in the calibration curve. Not all selenium species are present in preparation blanks; therefore, eMDL calculations based on preparation blanks are artificially biased low.

The eMDL for methylseleninic acid and selenomethionine is calculated from the average eMDL of selenite, selenate, and selenocyanate. The calibration does not contain methylseleninic acid or selenomethionine due to impurities in these standards which would bias the results for other selenium species.

If you have any questions or concerns regarding this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Russell Gerads', with a stylized, flowing script.

Russell Gerads
Vice President
Applied Speciation and Consulting, LLC

Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS Bi-Monthly Sampling)
 Contact: Jay Perkins
 LIMS #J12080079

Date: August 20, 2012
 Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Sample Results

Sample ID	Se(IV)	Se(VI)	SeCN	MeSe(IV)	SeMe	Unknown Se Species (n)
FGD Purge Eff	87.7	65.0	ND (<0.40)	ND (<1.7)	ND (<1.7)	0.0 (0)
BioReactor 1 Inf	23.0	69.3	ND (<0.099)	2.31	ND (<0.42)	0.0 (0)
BioReactor 2 Eff	ND (<0.81)	ND (<0.35)	ND (<0.099)	ND (<0.42)	ND (<0.42)	0.0 (0)
Metals Trip Blk	ND (<0.032)	ND (<0.014)	ND (<0.0040)	ND (<0.017)	ND (<0.017)	0.0 (0)

All results reflect the applied dilution and are reported in µg/L

ND = Not detected at the applied dilution

SeCN = Selenocyanate

MeSe(IV) = Methylseleninic acid

SeMe = Selenomethionine

Unknown Se Species = Total concentration of all unknown Se species observed by IC-ICP-MS

n = number of unknown Se species observed

Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS Bi-Monthly Sampling)
 Contact: Jay Perkins
 LIMS #J12080079

Date: August 20, 2012
 Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Quality Control Summary - Preparation Blank Summary

Analyte (µg/L)	PBW1	PBW2	PBW3	PBW4	Mean	StdDev	eMDL*	eMDL 10x	eMDL 250x
Se(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.0032	0.032	0.81
Se(VI)	0.000	0.000	0.000	0.000	0.000	0.000	0.0014	0.014	0.35
SeCN	0.000	0.000	0.000	0.000	0.000	0.000	0.00040	0.0040	0.099
MeSe(IV)	0.000	0.000	0.000	0.000	0.000	0.000	0.0017	0.017	0.42
SeMe	0.000	0.000	0.000	0.000	0.000	0.000	0.0017	0.017	0.42

eMDL = Estimated Method Detection Limit

*Please see narrative regarding eMDL calculations

Quality Control Summary - Certified Reference Materials

Analyte (µg/L)	CRM	True Value	Result	Recovery
Se(IV)	LCS	9.57	9.38	98.0
Se(VI)	LCS	9.48	8.95	94.4
SeCN	LCS	8.92	8.61	96.5
MeSe(IV)	LCS	6.47	6.60	102.0
SeMe	LCS	9.32	8.40	90.1

Selenium Speciation Results for Duke Energy
 Project Name: Belews - FGD WWTS Bi-Monthly Sampling)
 Contact: Jay Perkins
 LIMS #J12080079

Date: August 20, 2012
 Report Generated by: Russell Gerads
 Applied Speciation and Consulting, LLC

Quality Control Summary - Matrix Duplicates

Analyte (µg/L)	Sample ID	Rep 1	Rep 2	Mean	RPD
Se(IV)	BioReactor 2 Eff	ND (<0.81)	ND (<0.81)	NC	NC
Se(VI)	BioReactor 2 Eff	ND (<0.35)	ND (<0.35)	NC	NC
SeCN	BioReactor 2 Eff	ND (<0.099)	ND (<0.099)	NC	NC
MeSe(IV)	BioReactor 2 Eff	ND (<0.42)	ND (<0.42)	NC	NC
SeMe	BioReactor 2 Eff	ND (<0.42)	ND (<0.42)	NC	NC

ND = Not detected at the applied dilution

NC = Value was not calculated due to one or more concentrations below the eMDL

Quality Control Summary - Matrix Spike/ Matrix Spike Duplicate

Analyte (µg/L)	Sample ID	Spike Conc	MS Result	Recovery	Spike Conc	MSD Result	Recovery	RPD
Se(IV)	BioReactor 2 Eff	1390	1484	106.8	1390	1493	107.4	0.6
Se(VI)	BioReactor 2 Eff	1261	1301	103.1	1261	1318	104.5	1.3
SeCN	BioReactor 2 Eff	1144	1124	98.3	1144	1141	99.7	1.5

August 24, 2012

Duke Energy
ATTN: Jay Perkins
Scientific Support-Laboratory
13339 Hagers Ferry Road
Huntersville NC 28078
jcperkins@duke-energy.com
labcustomer@duke-energy.com

RE: Project DUK-HV1201

Client Project: J12080079

Dear Mr. Perkins,

On August 10, 2012, Brooks Rand Labs (BRL) received three (3) wastewater samples and three (3) corresponding field blanks. The samples were logged-in for total mercury (Hg) analysis according to the chain-of-custody form. All samples were received, prepared, analyzed, and stored according to BRL SOPs and EPA methodology.

The results were blank-corrected as described in the calculations section of the relevant SOP(s) and may have been evaluated using reporting limits that have been adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

Several continuing calibration blanks (CCBs) were analyzed on purge vessel (PV4) to remove any possible carryover. Following the CCBs, a non-reported continuing calibration verification (CCV) was analyzed on this same purge vessel, which resulted in an elevated recovery (157%). Since the result of the CCV was indicative of the carryover contamination, PV4 retired from service and no other client samples were analyzed using that purge vessel. All samples analyzed on PV4 were re-analyzed.

Sample *BioReactor 2 Inf* (1232034-03) yielded a non-detectable result. The BRL label and Duke Energy label were verified. The sample was re-analyzed twice and confirmed the original non-detectable result. Also, the result of field blank sample, *Hg Blk BioReactor 2 Eff* (1232034-06), was 29.9 ng/L and was significant when compared to the associated total Hg field sample result. It is entirely likely these samples were mislabeled in the field.

All data was reported without qualification, aside from concentration qualifiers, and all associated quality control sample results met the acceptance criteria.

BRL, an accredited laboratory, certifies the reported results of all analyses for which BRL is NELAP accredited meet all NELAP requirements. For more details, see the *Report Information* page of the report.

Please feel free to contact me if you have any questions regarding this report.

Sincerely,

A handwritten signature in black ink, reading "Tiffany Stilwater". The signature is fluid and cursive, with the first name "Tiffany" and last name "Stilwater" clearly legible.

Tiffany Stilwater
Project Manager
tiffany@brooksrnd.com

Report Information

Laboratory Accreditation

BRL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BRL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksrand.com/default.asp?contentID=586>. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

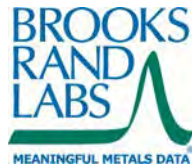
BLK	method blank	MS	matrix spike
BRL	Brooks Rand Labs	MSD	matrix spike duplicate
BS	laboratory fortified blank	ND	non-detect
CAL	calibration standard	NR	non-reportable
CCV	continuing calibration verification	PS	post preparation spike
COC	chain of custody record	REC	percent recovery
CRM	certified reference material	RPD	relative percent difference
D	dissolved fraction	RSD	relative standard deviation
DUP	duplicate	SCV	secondary calibration verification
ICV	initial calibration verification	SOP	standard operating procedure
MDL	method detection limit	SRM	standard reference material
MRL	method reporting limit	T	total recoverable fraction

Definition of Data Qualifiers

(Effective 9/23/09)

	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
B	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
E	Holding time and/or preservation requirements not met. Result is estimated.
H	Estimated value. A full explanation is presented in the narrative.
J	Duplicate precision (RPD) for associated QC sample was not within acceptance criteria. Result is estimated.
J-M	Spike recovery for associated QC sample was not within acceptance criteria. Result is estimated.
J-N	Duplicate precision (RPD) was not within acceptance criteria. Result is estimated.
M	Spike recovery was not within acceptance criteria. Result is estimated.
N	Rejected, unusable value. A full explanation is presented in the narrative.
R	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
U	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch.
X	Result is estimated.

These qualifiers are based on those previously utilized by Brooks Rand Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BRL.

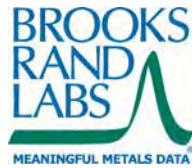


Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
BioReactor 1 Inf	1232034-01	Influent	Sample	08/08/2012	08/10/2012
Hg Blk BioReactor 1 Inf	1232034-02	DIW	Field Blank	08/08/2012	08/10/2012
BioReactor 2 Inf	1232034-03	Influent	QC Sample	08/08/2012	08/10/2012
Hg Blk BioReactor 2 Inf	1232034-04	DIW	Field Blank	08/08/2012	08/10/2012
BioReactor 2 Eff	1232034-05	Effluent	Sample	08/08/2012	08/10/2012
Hg Blk BioReactor 2 Eff	1232034-06	DIW	Field Blank	08/08/2012	08/10/2012

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
Hg	Water	EPA 1631	08/15/2012	08/17/2012	B121451	1200642



Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
BioReactor 1 Inf										
1232034-01	Hg	Influent	T	252		15.3	40.8	ng/L	B121451	1200642
BioReactor 2 Eff										
1232034-05	Hg	Effluent	T	106		1.53	4.08	ng/L	B121451	1200642
BioReactor 2 Inf										
1232034-03	Hg	Influent	T	0.15	U	0.15	0.41	ng/L	B121451	1200642
Hg Blk BioReactor 1 Inf										
1232034-02	Hg	DIW	T	0.15	U	0.15	0.40	ng/L	B121451	1200642
Hg Blk BioReactor 2 Eff										
1232034-06	Hg	DIW	T	29.9		0.15	0.40	ng/L	B121451	1200642
Hg Blk BioReactor 2 Inf										
1232034-04	Hg	DIW	T	0.15	U	0.15	0.40	ng/L	B121451	1200642



Accuracy & Precision Summary

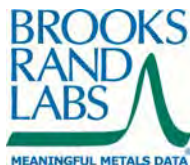
Batch: B121451
Lab Matrix: Water
Method: EPA 1631

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B121451-SRM1	Certified Reference Material (1232065, NIST 1641d 1000x dilution)						
	Hg		15.68	15.73	ng/L	100% 85-115	
B121451-MS2	Matrix Spike (1232034-01)						
	Hg	260.0	1224	1641	ng/L	113% 71-125	
B121451-MSD2	Matrix Spike Duplicate (1232034-01)						
	Hg	260.0	1224	1637	ng/L	112% 71-125	0.2% 24
B121451-MS3	Matrix Spike (1232034-03)						
	Hg	ND	2.035	2.19	ng/L	108% 71-125	

Method Blanks & Reporting Limits

Batch: B121451
Matrix: Water
Method: EPA 1631
Analyte: Hg

Sample	Result	Units		
B121451-BLK1	0.23	ng/L		
B121451-BLK2	0.17	ng/L		
B121451-BLK3	0.08	ng/L		
B121451-BLK4	0.07	ng/L		
Average: 0.14		Standard Deviation: 0.08		MDL: 0.15
Limit: 0.50		Limit: 0.10		MRL: 0.40



Instrument Calibration

Sequence: 1200642
Instrument: THG-05
Date: 08/17/2012
Analyte: Hg

Total Mercury and Mercury Speciation by CVAFS
Method: EPA 1631

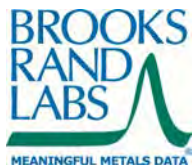
Lab ID	True Value	Result	Units	REC & Limits	
1200642-IBL1		5.91	pg of Hg		
1200642-IBL2		5.43	pg of Hg		
1200642-IBL3		4.83	pg of Hg		
1200642-IBL4		6.71	pg of Hg		
1200642-CAL1	25.00	25.25	pg of Hg	101%	
1200642-CAL2	100.0	93.67	pg of Hg	94%	
1200642-CAL3	500.0	477.2	pg of Hg	95%	
1200642-CAL4	2500	2661	pg of Hg	106%	
1200642-CAL5	10000	10470	pg of Hg	105%	
1200642-ICV1	1568	1573	pg of Hg	100%	85-115
1200642-CCV1	500.0	469.5	pg of Hg	94%	77-123
1200642-CCB1		12.0	pg of Hg		
1200642-CCB2		3260	pg of Hg		
1200642-CCB3		462	pg of Hg		
1200642-CCB4		645	pg of Hg		
1200642-CCB5		378	pg of Hg		
1200642-CCB6		284	pg of Hg		
1200642-CCB7		357	pg of Hg		
1200642-CCB8		222	pg of Hg		
1200642-CCV3	500.0	516.3	pg of Hg	103%	77-123
1200642-CCB9		2.30	pg of Hg		
1200642-CCV4	500.0	546.6	pg of Hg	109%	77-123
1200642-CCBA		3.49	pg of Hg		
1200642-ICB2		9.07	pg of Hg		
1200642-CCV5	500.0	546.0	pg of Hg	109%	77-123



Sample Containers

Lab ID: 1232034-01			Report Matrix: Influent			Collected: 08/08/2012		
Sample: BioReactor 1 Inf			Sample Type: Sample			Received: 08/10/2012		
Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.	
A	Bottle FLPE Hg-T	250 mL	71392670	none	n/a		Cooler	
			10					

Project ID: DUK-HV1201
PM: Tiffany Stilwater



Page 25 of 28
Client PM: Jay Perkins
Client PO: 141391

Shipping Containers

Cooler

Received: August 10, 2012 9:00
Tracking No: 5353 0519 2892 via FedEx
Coolant Type: Ice
Temperature: -0.8 °C

Description: Cooler
Damaged in transit? No
Returned to client? No

Custody seals present? No
Custody seals intact? No
COC present? Yes

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

1232034



Duke Energy Analytical Laboratory

Mail Code MGO3A2 (Building 7405)
13339 Hagers Ferry Rd
Huntersville, N. C. 28078
(704) 875-5245
Fax: (704) 875-4349

Analytical Laboratory Use Only

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Page 2 of 2
DISTRIBUTION
ORIGINAL to LAB,
COPY to CLIENT

1) Project Name Belews - FGD		2) Phone No:
WWTS (2011, Bi-Weekly Sampling)		
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson *		4) Fax No:
5) Business Unit:	6) Process:	Mail Code:
8) Oper. Unit:	9) Res. Type:	10) Reso. Center:

ORDER # 112080079	Sample Class OTHER	Samples Originating From NC 4 SC
Logged By R.H.	Date & Time 8/9/12 0947	SAMPLE PROGRAM Water _____ Ground NPDES Drinking Water UST _____ RCRA Waste _____
Vi Brooks Rand PO#141391		1.3 Cooler Temp (C) Preserv.: 1=HCL 2=H ₂ SO ₄ , 3=HNO ₃ 4=Ice, 5=None

MR #			Customer to complete all appropriate non-shaded areas.		16 Analyses Required	17 Comp.	18 Grab	19 Hg 1631 (sample 2nd week only)
Sampling conducted: 2nd Wednesday each month								
ID	13 Sample Description or ID	Date	Time	Signature				
	BioReactor 1 Inf	8/8	08:00	Travis Th...				1
	Hg Blk BioReactor 1 Inf		08:00	Travis Th...				1
	BioReactor 2 Inf		08:00	Travis Th...				1
	Hg Blk BioReactor 2 Inf		08:00	Travis Th...				1
	BioReactor 2 Eff		08:00	Travis Th...				1
	Hg Blk BioReactor 2 Eff		08:00	Travis Th...				1

Use the Bioreactor 2 Inf or EFF sample as the MS/MSD

Customer to sign & date below - fill out from left to right.

1) Relinquished By Travis Th...	Date/Time 8/8 08:00	2) Accepted By Cowley	Date/Time 8/8/12
3) Relinquished By Cowley	Date/Time 8/9/12 0940	4) Accepted By R. Harris	Date/Time 8/9/12 0940
5) Relinquished By	Date/Time	6) Accepted By	Date/Time
7) Relinquished By R. Harris	Date/Time 8/9/12 1300	8) Accepted By	Date/Time
9) Seal/Locked By R. Harris	Date/Time 8/9/12 1300	10) Seal/Lock Opened By Cowley	Date/Time 8/10/12 0900
11) Seal/Locked By	Date/Time	12) Seal/Lock Opened By	Date/Time

Comments

* Metals=As, Ag, B, Cu, Cr, Ni, Se, Zn *thomas.d.johnson@siemens.com

Customer, IMPORTANT!
Please indicate desired turnaround.

22 Requested Turnaround

14 Days _____

*7 Days _____

*48 Hr _____

*Other _____

*Add. Cost Will Apply

8-16-12

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM



Duke Energy Analytical Laboratory
 Mail Code MGO3A2 (Building 7405)
 13339 Hagers Ferry Rd
 Huntersville, N. C. 28078
 (704) 875-5245
 Fax: (704) 875-4349

1) Project Name Belews - FGD WWTs Bi-Monthly Sampling)	2) Phone No:
2) Client: Bill Kennedy, Melonie Martin, Wayne Chapman, Tom Johnson **	4) Fax No:
5) Business Unit:	6) Process: Mail Code:
8) Oper. Unit:	9) Res. Type: 10) Reso. Center:

Analytical Laboratory Use Only	
ORDER# 512080079	MATRIX: OTHER
Logged By BA	Date & Time 8/9/12 0947
AS&C PO#133241	
Cooler Temp (C) 13	
15 Preserv.: 1=HCL 2=H ₂ SO ₄ 3=HNO ₃ 4=Ice 5=None	

¹⁹Page 1 of Page 27 of 28
DISTRIBUTION
 ORIGINAL to LAB,
 COPY to CLIENT

LAB USE ONLY
¹¹ Lab ID
2012016850
51
52
53
54
55
56

Se Speciation Bottle ID	¹³ Sample Description or ID	Sampling conducted: 2nd and 4th Wednesday			¹⁷ Comp.	¹⁸ Grab	TDS	Hg - 245.1	Br (Dionex)	Metals*	Mn (ICP) Se (IMS), sol.	Se, speciation - vendor to AS&C (Important to place filled bottle back into both baggies)				
		Date	Time	Signature												
	FGD Purge Eff	8/8	08:30	Travis Throck			1	1	1	1	1	1				
	EQ Tank Eff.	8/8	08:30	Travis Throck				1		1	1					
	BioReactor 1 Inf	8/8	08:30	Travis Throck						1	1	1				
	BioReactor 2 Inf	8/8	08:30	Travis Throck						1						
	BioReactor 2 Eff	8/8	08:30	Travis Throck				1	1	1		1				
	Filter Blk	8/8	08:30	Travis Throck							1					
	Metals Trip Blk									1		1				
Filtering of the Se is performed in the field please provide a filter blank too.																

1) Relinquished By Travis Throck	Date/Time 8/8 08:30	2) Accepted By COUNNER	Date/Time 8/8/12
3) Relinquished By COUNNER	Date/Time 8/9/12 0940	4) Accepted By L. Davis	Date/Time 8/9/12 0940
5) Relinquished By	Date/Time	6) Accepted By	Date/Time
7) Relinquished By L. Davis	Date/Time 8/9/12 1300	8) Accepted By	Date/Time
9) Seal/Locked By L. Davis	Date/Time 8/9/12 1300	10) Seal/Lock Opened By	Date/Time
11) Seal/Locked By	Date/Time	12) Seal/Lock Opened By	Date/Time

Customer, IMPORTANT!
 Please indicate desired turnaround.

²²Requested Turnaround

14 Days _____

*7 Days _____

*48 Hr _____

*Other _____

*Add. Cost Will Apply

8-10-12

* B, Mn by TRM/ICP As, Cr, Cu, Ni, Se, Ag, Zn by TRM/IMS thomas.d.johnson@siemens.com

